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lark whose pure minor notes have the sweetness, the serenity, and uplift that belong to the big clean prairie open under the sky. Beautiful prairies! How they fill the imagination and free the mind of the escaped city dweller! Miles and miles of prairie with hardly a house in sight, unclouded skies, and strong vivifying sunshine tempered by the cool fresh wind from far away!

Washington, D. C., May 23, 1915.

A WALKING EAGLE FROM RANCHO LA BREA

By LOYE HOLMES MILLER

WITH ONE PHOTO BY H. S. SWARTH

TO DISCUSS in a magazine of ornithology an extinct species of bird whose latest known remains are perhaps a quarter of a million years old may seem a bit of an impropriety—an unwarranted liberty to take with *THE CONDOR*'s pages; yet many have indiscreetly (or politely) enquired from time to time of the progress of work on the Rancho La Brea fossil birds; hence this proffered contribution. The finding of remains of Labrador Duck, Pallas Cormorant, or Great Auk, would furnish a news item which many would read with great interest. An egg of the Great Auk put up at auction among enthusiastic collectors would stimulate an interest easier to imagine than to describe. These birds are extinct. Most ornithologists know, and will know, little of them beyond the fact that they are extinct, yet the very name has a sound that catches the attention. It is hoped that *Morphnus daggetti* may appeal as having at least the distinction of extinction. Really, though, to the enthusiast, there are other reasons why he is of interest.

Among the hundred thousand or more bird bones in the collection made at Rancho La Brea by the Los Angeles Museum of History, Science, and Art, there have been found two specimens which represent a species of eagle of most astonishing character. The part represented is that segment of the posterior limb known to the ornithologist as the tarsus—perhaps the most characteristic bone of the bird's body. This certainly is an eagle's tarsus. It is somewhat less in transverse measurement than is the same bone of the golden eagle (*Aquila*), but in linear dimension it is nothing less than startling. When it is laid alongside of the tarsus of the Great Blue Heron (*Ardea*, see fig. 63) there is seen to be less than a quarter of an inch difference in length between the two bones. An eagle on stilts is the instant impression—an impression not new to one who has seen that South African anomaly, the Secretary Bird (*Serpentarius*), yet an impression that comes as a breath-catching surprise here in the vicinity of Los Angeles.

It was the writer's great pleasure, through courtesy of the New York Zoological Society, to enter the cages at the Bronx and study the live Secretary Bird in its feeding, running, and perching actions. The prehensile function of the foot has been entirely abandoned for the sake of an ambulatory function. The Secretary Bird is indeed a stilt-walker—an eagle without talons. When the long-shanked eagle from the asphalt was first encountered, the questions at once arose: "Is there evidence of degeneracy as an eagle? Was he a walking bird? Does he show kinship with South Africa and her Secretary Bird?"

There certainly is evidence of degeneracy of the eagle-like function of the foot. Let us examine the evidence. The points of attachment of muscles to bones are commonly marked by distinct roughnesses of very definite position. In a foot of great lifting power, the attachment of those muscles which bend the leg at the tarsal joint are relatively far down the shaft of the tarsus, thus affording greater leverage for the lift. In like manner one grasps farther down on the pitchfork handle in lifting a heavier shock of hay. Wading, running, and walking forms of birds employ the opposite method of attachment, sacrificing lifting power to gain distance of stride in the foot. To continue the homely comparison, the hay-maker shifts his hand back toward the end of his fork-handle after the weight has been raised and he wishes to gain distance for heaving his hay upon the load. *Morphnus daggetti* has similarly shifted his grip on his tarsal lever, or he has accomplished what is in effect the same, by an extreme elongation of the shaft beyond the point of muscle attachment.

This great long-shanked eagle has a power arm in his lever no longer than that of the Ferruginous Roughleg (*Archibuteo*), although the resistance arm is almost twice as long as that of the same species. The Caracara (*Polyborus*), who walks as readily as a turkey, has almost exactly the same relative position of its muscle attachment as has this great extinct eagle. The conclusion is unavoidable that the lifting power of the foot was extremely low.

But what of the grasping power of his toes? The three front toes of a bird are attached at the extremity of the tarsus to three articular surfaces known as trochleae. In the powerfully predaceous raptors these trochleae are deeply grooved and are set somewhat obliquely upon the shaft. Evidence of decline of the raptorial habit is seen in *M. daggetti* in the fact that these trochleae are more uniform, less deeply grooved, and are set less obliquely upon the tarsal shaft. This condition is carried to its extreme in the Old World

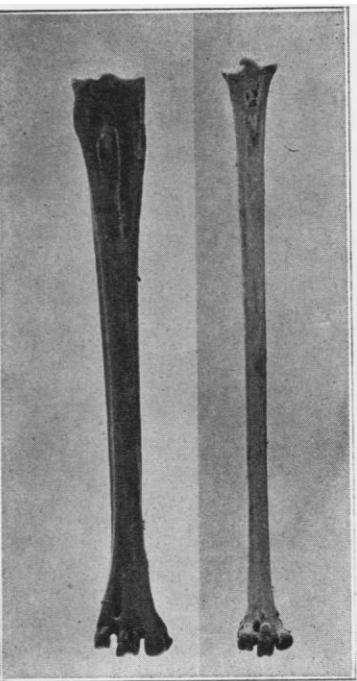


Fig. 63. TARSOMETATARSUS OF *Morphnus daggetti* (AT LEFT) AND OF *Ardea herodias*; BOTH ABOUT TWO-THIRDS NATURAL SIZE

vultures which are conceded to be degenerate raptors, and is in marked contrast to the conditions in *Aquila* and *Haliaeetus*. The conclusion seems inevitable that this peculiar asphalt species was of more or less ambulatory habits—a bird which had forsaken the more actively predaceous manner of his aquiline ancestry and lengthened out his shanks in much the same way, though perhaps not to the same degree, as has the Roadrunner (*Geococcyx*) forsaken the tree-dwelling life of his cuckoo kindred to put on stilts.

A condensed description of the new species is appended for the more technical student.

***Morphnus daggetti*, new species;** type specimen, no. A-380, Los Angeles Museum of History, Science, and Art; a tarsometatarsus. Assignment of this

species to the genus *Morphnus* instead of to *Geranoëtus* is based upon differences in the head of the tarsometatarsus. The length of the tendinous bridge is less in *Morphnus*, as is likewise the development of the outer hypotarsal ridge. The difference is constant though slight. The affinities of the fossil specimen as indicated by these characters are with *Morphnus*.

Distinctive characters of the species are: extreme elongation of the tarsal shaft; weakness of the distal trochleae, which are set less obliquely on the shaft and are less grooved; extreme reduction of the ratio of power arm to resistance arm. In *Aquila* this last-named ratio is .303, in *Morphnus guianensis* it is .171, in the fossil species but .125.

Table of measurements in millimeters of <i>Morphnus daggetti</i> , tarsometatarsus:	
Total length over all	167.0
Transverse diameter of head	20.8
Transverse diameter through trochleae	22.8
Transverse diameter of shaft	9.1
Length of power arm	20.6
Ratio of power to weight arm125

The species is named in honor of Mr. F. S. Daggett, through whose kindness the collections at the Museum of History, Science, and Art have been opened to the writer's inspection.

Los Angeles, California, August 1, 1915.

ESTIMATED AVERAGE AGE OF THE HERRING GULL*

By JOHN TREADWELL NICHOLS

INTRODUCTION

AT THE A. O. U. CONGRESS held in Washington in 1914, the writer presented a paper on the proportions of different ages of the Herring Gull, as bearing on the average age which birds of the species reach. The proportion of first year birds was estimated from data gathered by observing gulls from ferry-boats in New York Harbor, supplemented to some extent by observations on Long Island and elsewhere. During the season of 1914-15 more data has been similarly collected, and the results obtained, if not unimpeachable, are believed to be interesting and worthy of publication. They indicate an average age of 16.2 years attained by birds which have reached the second winter, and very high mortality between the first and second winters.

ARGUMENT

In *Science* for October 25, 1912, page 565, is a suggestive article by W. J. Spillman, of Washington, D. C., entitled "A Method of Determining the Average Length of Life of Farm Equipment", in which it is shown that in dealing with a constant population of either inanimate or animate objects, "if we divide the total number of objects of all ages . . . by the average number in their first year the quotient will be the average length of life that those now in their first year will live". By this formula the numbers of first-winter Herring Gulls divided into the total Herring Gull population gives their average length of life. First-year Herring Gulls are dark in plumage, readily separable from second year or

*Read at the A. O. U. Congress, San Francisco, May 18, 1915.